# Vehicular SU 2500
# Vehicular SU 3500
# Vehicular SU 3600
# Vehicular SU 5000

## Product Release 1.0
## GA Release Note

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# 1. General

This document details the main hardware elements, software features, known limitations, and interoperability information as well as the documentation available for release 1.0 of the Vehicular Subscriber Unit (VSU) in multiple models at different frequencies.

# 2. The Product Released

The Vehicular Subscriber Unit (VSU) is a ruggedized WiMAX 16e (IEEE 802.16e-2005) subscriber solution for nomadic or mobile applications available in multiple frequencies. The VSU is designed to withstand the shock and vibrations that are typical of vehicular scenarios. The VSU enclosure is designed to meet IP-67 therefore is suitable not only for vehicle interior installation but also for outdoor installation on the vehicle exterior.

The VSU may be connected directly to the vehicle power source, weather it is 12 or 24 VDC. Supporting advanced antenna system with 2 Rx and 1 Tx, the VSU connects to two antennas via two N-Type connectors. Accessories including antennas and antenna mounting kits are also available, as detailed herein.

Supporting both of Alvarion's state of the art infrastructures – the BreezeMAX Extreme and BreezeMAX 4Motion, the VSU offers all the advantages of the WiMAX 16e to the licensed and licensed-exempt frequency bands. Leveraging the carrier class QoS along with the superior radio technology, formed in a ruggedized form factor, the VSU enables diverse services in a wide range of spectrum options for Smart City applications, Public Safety and First Responders, Transportation, Utilities, Mining, Ports and Corporate.

The VSU is available in the following frequency configurations:

| Product Model | Frequency Range | Extreme Infrastructure | 4Motion Infrastructure |
|---|---|---|---|
| VSU 2500 | 2.496-2.690 GHz | | Yes |
| VSU 3500 | 3.400-3.600 GHz | Yes | Yes |
| VSU 3600 | 3.600-3.800 GHz | Yes | Yes |
| VSU 5000 | 4.900-5.900 GHz | Yes | |

**Important notes:**

- Usage of the VSU should be done in compliance with the local laws and regulations.
- ONLY experienced installation professionals who are familiar with radio equipment for outdoor/indoor, local radio regulations, relevant local building and safety codes and, wherever applicable, are licensed by the appropriate government regulatory authorities should install outdoor units and antennas and should do so in accordance to the local regulations applicable.
- Due to the requirements of FCC regulations in 5GHz bands, once setting the country code of VSU 5000 to FCC, it would not be possible to further modify the country code to any other country band.

# 3. About This Release

Release 1.0 of the Vehicular Subscribers introduces the solution to market and includes the following elements and main capabilities.

## 3.1. VSU Product Models

The following new VSU models are introduced with this release:

| Part Number | Model | Description |
|---|---|---|
| 950501 | Vehicular SU XTRM-K2-1D-4.9 | VSU 5000 - Vehicular outdoor subscriber radio unit, 5.x GHz (4.9-5.9 GHz). With 2 N-Type connectors for external antenna. Input power range of 10-32VDC through a Molex power connector.<br>7 meter power cable with Molex connector is included. |
| 950502 | Vehicular SU 4M-PRO3K-1D-2.5 | VSU 2500 - Vehicular outdoor subscriber radio unit, 2.5 GHz (2.496-2.690 GHz). With 2 N-Type connectors for external antenna. Input power range of 10-32VDC through a Molex power connector.<br>7 meter power cable with Molex connector is included. |
| 950503 | Vehicular SU 4M-PRO3K-1D-3.5 | VSU 3500 - Vehicular outdoor subscriber radio unit, 3.4-3.6 GHz. With 2 N-Type connectors for external antenna. Input power range of 10-32VDC through a Molex power connector.<br>7 meter power cable with Molex connector is included. |
| 950504 | Vehicular SU Pro3K - 3.6 | VSU 3600 - Vehicular outdoor subscriber radio unit, 3.6-3.8 GHz. With 2 N-Type connectors for external antenna. Input power range of 10-32VDC through a Molex power connector.<br>7 meter power cable with Molex connector is included. |

## 3.2. VSU Accessories

The following accessories are available with this release:

| Part Number | Model | Description |
|---|---|---|
| 300721 | ANT,OMNI Vehicular, 5.XGHz Low Profile | Omni antenna for vehicular application for 4.9-5.9GHz, 4dBi gain. Should be ordered with one of the mobile mounting antenna kits (300723 or 300724) |
| 300722 | ANT,OMNI Vehicular, 2-3.8GHz Low Profile | Omni antenna for vehicular application for 2.0-3.8GHz, 4dBi gain. Should be ordered with one of the mobile mounting antenna kits (300723 or 300724) |
| 300723 | Mobile Magnet Mounting | A magnet mounting kit for the vehicular antennas (300712 and 300722). Includes magnet mount and a 3m LMR 195 cable with N-Type male termination (attached directly to the Vehicular subscriber N-Type connector) |
| 300724 | Mobile Fixed Mounting | A fixed (pass-through) mounting kit for the vehicular antennas (300712 and 300722). Includes fixed mount and a 3m LMR 195 cable (open end). A N-Type male connector is included in the kit for on-site crimping |

## 3.3. Release Software Version

The Vehicular SU models software release is aligned and part of the prime modem family software packages. Therefore, the VSU models would have software releases together, and as part of, the listed product family stated below. The following table also includes the current software versions used with this release:

| VSU | VSU Modem Part of Family | Current Software Release |
|---|---|---|
| VSU 2500 | PRO 3000 CPE (2.5GHz) | 6.6.16 |
| VSU 3500 | PRO 3000 CPE (3.5GHz) | 6.6.16 |
| VSU 3600 | PRO 3000 CPE (3.6GHz) | 6.6.13* |
| VSU 5000 | PRO 5000 CPE | 1.7.2.5 |

* When operating with 4Motion infrastructure, the VSU 3600 should be upgraded to version 6.6.16

Future software release of the modem family will be applicable also for the Vehicular SU models.

The software upgrade procedure and methodology should be in accordance to the specific software release guidelines. Note that that software upgrade can be performed either through the LAN or over the air.

## 3.4. Main Features

For the complete product specifications, please refer to the technical specification document or to the product manual.

The following features and functionalities are supported with this release.

- **WiMAX 16e modem fully compatible with Alvarion RAN solutions**

  The vehicular subscriber unit is based on mature radio modules and software that are fully compatible with Alvarion's RAN solutions.

  Specifically:

  - VSU 5000 is fully compatible with the Extreme 5000 WiMAX 16e solution for the 5GHz band.
  - VSU 3600/3500 are fully compatible with the Extreme 3600/3500 and BreezeMAX 4Motion 16e infrastructures, and
  - VSU 2500 is fully compatible with the BreezeMAX 4Motion 16e solution in 2.5GHz band.

- **Supports full mobility / nomadicity based on infrastructure capability**

  The vehicular subscriber unit is capable of full mobility, supporting handover or nomadic solution ("break-before-make"), depending on the infrastructure capabilities. That is, when VSU operates in a BreezeMAX 4Motion network, it supports full mobility, and when it operates in a BreezeMAX Extreme network, it supports nomadicity.

- **Designed for direct feed from vehicle power source**

  The vehicular subscriber unit can connect directly to a 12 VDC or 24 VDC power source. The vehicular subscriber kit includes a 7m DC cable including a fuse-housing and a fuse for easy and safe installation to the vehicle power source.

- **Auto-Shutdown**

  In case that the vehicular subscriber power source drops below 9 VDC or goes above 36 VDC, the vehicular subscriber unit would auto shutdown.

- **Designed for interior or exterior installation**

  The VSU is an IP-67 certified device, and as such it can be installed in an all-outdoor environment (e.g. truck pole/rooftop) or in the vehicle interior – the VSU mechanics is designed with proper locations for either mounting screws of various sizes or mounting bands (for pole mounting).

- **Designed to withstand vehicle vibrations**

  The VSU is designed to meet the ETSI EN 300 019-2-5 (5M3) standard, as such it is in compliance also with the MIL-STD-810D standard for the relevant shock and vibrations specifications.

# 4. Network Management Support

The Vehicular SUs are managed either through a web interface for a single element management or over TR-69 using the StarACS CPE management system.

# 5. Documentation

The following documents are available with this release,:

- Vehicular SU Product Manual
- Vehicular SU Quick Installation Guide

The following supportive documents are also available:

- Vehicular SU Brochure
- Vehicular SU Technical Specifications
- Vehicular SU Ordering Information
- Vehicular SU antennas datasheet and pattern files
- AlvariSTAR User Manual (part of AlvariSTAR CD)
- AlvariCRAFT User Manual (part of AlvariSTAR CD)

# 6. Typical Deployment Scenarios

# 7. Recommendations and Important Notifications

1. When deploying the Vehicular Subscriber Unit, please refer to the following recommendations:
   - To obtain best nomadicity results between sectors with the VSU, set the following:
     - For VSU 2500/3500/3600, set “Mobile Mode” to “Mobile”
     - For VSU 5000 set “Mobility Mode” to “Mobile”
   - When working in IP-CS mode with a router behind VSU 5000, set the "Ethernet Downtime" on the VSU 5000 to be sufficient for the router to detect that the PHY is down and apply a DHCP renew – the value may vary between various router vendors.
   - The MAC address stated on the VSU 5000 label represents the LAN MAC address. The VSU 5000 WAN MAC address (used for instance for local provisioning of the SU) is according to the following rule: WAN MAC = LAN MAC + 1
2. When performing software upgrade for the VSU through the StarACS, the process is as follows:
   a) The software is downloaded to the unit.
   b) Upon successful completion, the unit automatically performs "run from shadow" and resets.
   c) After link with BTS is established, the new version is set as main automatically by the device
3. DHCP server for the VSU management IP or the hosts behind the VSU should not contain the IP addresses pool range of 192.168.254.0 to 192.168.254.255. This is mainly since the IP address 192.168.254.251/24 is the static local IP address (from the LAN) and as such reserves this subnet for local VSU provisioning.
4. Due to FCC regulation requirements, the unit latches “FCC” country setting, namely:
   - If a unit is set from the factory to “FCC” country code, the unit is locked to FCC and it is impossible to change the country code to any value other than “FCC”.
   - When changing the country code to “FCC” in a unit, the country code would lock on “FCC” and no further changes of the country code are allowed.

# 8. Known Issues and Limitations

Please refer to the prime modems (PRO 3000 for VSU 2500/3500/3600, and Extreme PRO 5000 for VSU 5000) software release notes for detailed information of the most updated software release.

For the current modem software introduced, the following known issues and limitations are valid:

## 8.1. Vehicular SU 5000

1. Ping messages of 25000 bytes transmitted over R1 (to the host behind VSU) are sometimes unanswered. There is no issue observed with Ping messages of up to 14K bytes.
2. Software upgrade may fail if the WAN management IP is changed during the software upgrade process.
3. Sending IP fragmented packets between the MS and the BTS may result in packet loss.
4. When operating with the PPPoE service profile, the service lines cannot be configured with transparent VLAN 1P.
5. On VSU 5000, if the currently configured country code is Universal and the scanning range is from 4.9 to 5.9 GHz, and scanning over all the channel BW, the VSU will reboot in 30minutes if no BTS is found eligible for association until the scanning module has finished scanning for all the configured channels.

### 8.2. Vehicular SU 2500/3500/3600

DSCP over PPPoE classification is not supported.

1. Ping messages of 25000 bytes transmitted over R1 (to the host behind VSU) are sometimes unanswered. There is no issue observed with Ping messages of up to 14K bytes.
2. Software upgrade over the WAN (over the air) may fail if the WAN management IP is changed during the software upgrade process, or if the link is unstable (poor radio quality).
3. VSU 2500/3500/3600 does not support packet fragmentation, thus sending IP fragmented packets between the MS and the BTS may result in packet loss.
4. Under firewall settings, “Deny” settings override “Allow" settings. To overcome this limitation, define “Deny configuration” first and then define “Allow all” for all other.
5. Web GUI is not accessible after disabling all user accounts (only Operator can disable all user accounts). In this case reset the unit to factory defaults or RMA replacement is required.
6. PPPoE connections over VLAN tagging is not supported

## 9. Bug Fixes

As this is the first release of the VSU no bug fixes are introduced over previous versions.

Compatibility Matrix

Within the scope of Release 1.0 of the VSU, the following compatibility matrix applies:

| VSU | VSU software | BreezeMAX Extreme Model and Software | BreezeMAX 4Motion Model and Software |
|---|---|---|---|
| VSU 2500 | 6.6.16 | Not supported | 3.0 GA<br>3.1 GA<br>3.2 |
| VSU 3500 | 6.6.16 | Planed for Ver.1.8 with Extreme 3500 | 3.0 GA<br>3.1 GA<br>3.2 |
| VSU 3600 | 6.6.13 | Extreme 3600<br>Ver.1.7.1.35 | Not supported |
| | 6.6.16 | Extreme 3600<br>[Planed with release 1.8] | 3.0 GA<br>3.1 GA<br>3.2 |
| VSU 5000 | 1.7.2.5 | Extreme 5000<br>Ver.1.7.1.35 | Not supported |

**Notes:**

- It is always recommended to use latest available official releases across all network elements
- When downgrading to or working under a mixed version environment, it is important to use settings that are in the common denominator of the subscribers and the base station infrastructure.